

1. A polynucleotide selected from the group consisting of:

- (a) a polynucleotide comprising the nucleotide sequence set forth in SEQ ID NO: 1;
- (b) a polynucleotide encoding a polypeptide comprising the amino acid sequence set forth in SEQ ID NO: 2;
- (c) a polynucleotide hybridizing to a DNA comprising the nucleotide sequence set forth in SEQ ID NO: 1 under a stringent condition, wherein said polynucleotide encodes a polypeptide having the activity of a D-aminoacylase having the physicochemical properties of (i) and (ii) below; and
- (d) a polynucleotide encoding a polypeptide having the amino acid sequence set forth in SEQ ID NO: 2 in which one or more amino acid are substituted, deleted, inserted, and/or added, wherein said polynucleotide encodes a polypeptide having the activity of a D-aminoacylase having the physicochemical properties of (i) and (ii) below

- (i) action: the enzyme acts on N-acetyl-D-amino acids to produce the corresponding D-amino acids and
- (ii) substrate specificity: the enzyme acts on N-acetyl-D-tryptophan, N-acetyl-D-phenylalanine, N-acetyl-D-valine, N-acetyl-D-leucine, and N-acetyl-D-methionine, but not on N-acetyl-L-tryptophan, N-acetyl-L-phenylalanine, N-acetyl-L-valine, N-acetyl-L-leucine, or N-acetyl-L-methionine.

2. A polypeptide encoded by the polynucleotide of claim 1.

3. A vector comprising the polynucleotide of claim 1.

4. A transformed host cell comprising the polynucleotide of claim 1.

5. The transformed host cell of claim 4, wherein said cell is derived from *E. coli*.

6. A method of producing a polypeptide, said method comprising culturing the transformed host cell of claim 4 in a culture, expressing the polypeptide in the cell, and recovering the polypeptide from the culture.

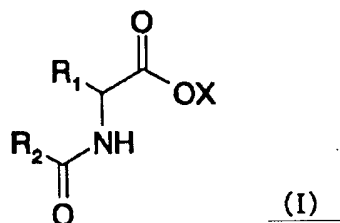
7. The method of claim 6, wherein said cell is derived from *E. coli*.

1 8. A polynucleotide hybridizing to the polynucleotide set forth in SEQ ID NO: 1 or the  
2 complement thereof, wherein said polynucleotide comprises at least 15 nucleotides.

1 9. A method for synthesizing a polynucleotide, said method comprising chemically  
2 synthesizing the polynucleotide of claim 8.

1 10. A method for detecting a polynucleotide, said method comprising hybridizing the  
2 polynucleotide of claim 8 to a test polynucleotide, and determining whether hybridization has  
3 occurred.

1 11. A method for producing D-amino acids, said method comprising contacting a  
2 polypeptide with N-acyl-DL-amino acid represented by the formula (I) or its salt:



3  
4 wherein R<sub>1</sub> and R<sub>2</sub> may be identical or different and each represents a hydrogen atom or a  
5 substituted or unsubstituted hydrocarbon group; R<sub>2</sub> does not represent a hydrogen atom; and  
6 X is H, NH<sub>4</sub>, or a metal ion.

1 12. The method of claim 11, wherein R<sub>1</sub> and R<sub>2</sub> in the formula (I) each represents an  
2 alkyl, alkenyl, alkynyl, cycloalkyl, aryl, or aralkyl group, or the derivative thereof.

1 13. The method of claim 12, wherein R<sub>1</sub> is a β-methylindolyl, benzyl, thiomethylethyl,  
2 isopropyl, or 2-methyl-propyl group; and R<sub>2</sub> is a methyl, chloromethyl, phenyl, or  
3 aminomethyl group.